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UTILITY PATENT APPLICATION TRANSMITTAL (New Nonprovisional Applications Under 37 CFR § 1.53(b))	Attorney Docket No. **1000**

JC903 U.S. PTO 09/711850 11/13/00

TO THE ASSISTANT COMMISSIONER FOR PATENTS:

Transmitted herewith is the patent application of ( ) application identifier or (X) first named inventor, **Raj BRIDGELALL**, entitled **Combined Magnetic Stripe Reader and Radio Frequency Tag Reader in Data Collection Module**, for a(n):

(X) Original Patent Application.

( ) Continuing Application (prior application not abandoned):

( ) Continuation ( ) Divisional ( ) Continuation-in-part (CIP)
of prior Application No. _____, filed on _____.

( ) A statement claiming priority under 35 USC § 120 has been added to the specification.

Enclosed are:

(X) Specification; **13** Total Pages. **(X)** Drawing(s); **2** Total Sheets.

( ) Oath or Declaration:

( ) A Newly Executed Combined Declaration and Power of Attorney:

( ) Signed. ( ) Unsigned. ( ) Partially Signed.

( ) A Copy from a Prior Application for Continuation/Divisional (37 CFR § 1.63(d)).

( ) Incorporation by Reference. The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied, is considered as being part of the disclosure of the accompanying application and is hereby incorporated herein by reference.

( ) Signed Statement Deleting Inventor(s) Named in the Prior Application. (37 CFR § 163(d)(2)).

( ) Power of Attorney. **(X)** Return Receipt Postcard.

( ) Associate Power of Attorney. ( ) A Check in the amount of $_____ for the Filing Fee.

( ) Preliminary Amendment. ( ) Information Disclosure Statement and Form PTO-1449.

( ) A Certified Copy of Priority Documents (if foreign priority is claimed).

( ) Statement(s) of Status as a Small Entity.

( ) Statement(s) of Status as a Small Entity Filed in Prior Application, Status Still Proper and Desired.

( ) Other: _____.

CLAIMS AS FILED				
FOR	NO. FILED	NO. EXTRA	RATE	FEE
Total Claims	19	0	$18.00	$0.00
Independent Claims	3	0	$80.00	$0.00
Multiple Dependent Claim Fee (if applicable)				$0.00
Assignment Recording Fee (if applicable)				$0.00
Basic Filing Fee				$710.00
			Total Filing Fee	$710.00

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Respectfully submitted,

By: _____

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Date: November 13, 2000

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COMBINED MAGNETIC STRIPE READER AND RADIO FREQUENCY TAG READER IN DATA COLLECTION MODULE

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

The present invention generally relates to data collection and methods of collecting data, especially from radio frequency tags and magnetic stripe cards.

DESCRIPTION OF THE RELATED ART

Radio frequency (RF) tags or targets bear data that can be electronically written and rewritten, and that can interrogated or polled remotely, even through opaque surfaces. The tags have RF resonators such as quartz crystals or dipoles. An RF reader activates an RF source and detects the RF response characteristics of the tag to generate data relating to an object with which the tag is associated.

Magnetic stripes bear data that can be electromagnetically written and rewritten, and that can be read by magnetic stripe readers or sensors. The stripes are provided on cards, such as credit, debit or identification cards, each stripe extending along a longitudinal direction generally parallel to a longitudinal edge of a respective card.

In the automatic identification and data capture (AIDC) industry, certain form factors, i.e., specific space allocations for devices having known functionalities, have become standards. One such form factor for a scan engine module known as the "SE 1200" has been adopted by the AIDC industry and is produced by Symbol Technologies,

Inc. of Holtsville, New York, the assignee of the instant application. The SE 1200 module is used in hand-held scanners for reading bar code symbols and has a parallelepiped shape measuring 1-½ inches in length, 1 inch in width, and ¾ of an inch in height.

However, because this form factor is standardized and, therefore, the space allocated is limited to a certain, fixed size and shape, the functionality of the SE 1200 module is limited as well since additional circuits and functions cannot readily be added to the existing allocated space and circuitry. Also, the input and output interfaces of this module are fixed, and any new functions or circuits must employ the given interfaces.

SUMMARY OF THE INVENTION

OBJECTS OF THE INVENTION

Accordingly, it is a general object of this invention to combine an RF tag reader and a magnetic stripe reader on a common support, especially on a standard form factor such as the SE 1200 module.

It is another object of this invention to add increased functionality to a module having a standardized form factor and interface by utilizing the circuitry and interface already present on the module to support the added functionality.

FEATURES OF THE INVENTION

In keeping with the above objects and others which will become apparent hereafter, one feature of the present invention resides, briefly stated, in a radio frequency (RF) reader and a magnetic stripe reader both supported on a common support having a

predetermined form factor, especially the aforementioned SE 1200 module on which a bar code symbol reader is already supported. The RF reader is operative for interrogating an RF element, such as a dipole or analogous resonant element, associated with a target, and for reading RF data relating to the target from the interrogated element. The stripe reader is operative for sensing magnetically encoded data in a stripe on a card, such as a credit, debit or identification card, and for reading the encoded data.

In a preferred embodiment, electrical components for the RF and stripe readers are mounted on a printed circuit board supported by the module. These components generate digital signals corresponding to the RF data and the magnetically encoded data. A central processing unit supported by the module receives and processes these digital signals, and outputs the processed signals through a common interface.

The novel features which are considered as characteristic of the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram of an RF reader circuit and a magnetic stripe reader circuit together with a bar code symbol reader circuit in accordance with this invention;

FIG. 2 is a perspective view, from the front and below, of a module for supporting the circuits of FIG. 1;

FIG. 3 is a perspective view, from the rear and below, of the module of FIG. 2; and

FIG. 4 is a perspective view of a data collection terminal having the module of FIGS. 2-3 therein during a card reading procedure.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings, reference numeral 10 generally identifies a block diagram of a module according to this invention. Module 10 includes an RF reader circuit 12 having a wireless data transceiver 14 for emitting RF energy via a transmitting antenna 16 to interrogate or poll at least one resonant element or resonator 18 associated with a target 20.

The resonator 18 may be a quartz crystal or preferably a dipole. The dipole may be a metal-coated fiber resonant at a frequency dependent on the fiber length. The dipole may be embedded in, or affixed to, any target. Preferably, the dipole is carried on a tag or label that is attached, usually by an adhesive, to an object.

The interrogated dipole emits an RF response characteristic which is detected by a receiving antenna 20. The received RF signal is conducted to the wireless transceiver 14 and thereupon is processed in a signal processor 22 which comprises an amplifier, a

bandpass filter, a multiplier for sampling the received signal at a rate controlled by a counter to produce a sampled signal, a peak detector for determining the magnitude and duration of the peaks in the sampled signal, an automatic gain controller, and a digitizer for converting the analog sampled signal to a digital signal. The digital signal is then conducted to a central processor unit (CPU) 24 for processing in accordance with a stored algorithm. A memory 26 is connected to the CPU for data storage and retrieval. An output signal from the CPU is conducted therefrom through an interface, typically a single eight-pin connector 28.

Reference numeral 30 generally identifies a magnetic stripe reader circuit having at least one sensor 32, and preferably a plurality of sensors, connected to a signal processor and digitizer circuit 34. A card 40 such as a credit, debit or identification card of generally rectangular form includes an elongated magnetic stripe 36 that has information encoded therein.

The card 40 may have user identification thereon in human-readable form such as name and address data 38, or a photograph 42 of the card's owner, or other information relating to the user, such as insurer data (in the case of a medical or patient card), motor vehicle data (in the case of a vehicle license and registration card), financial institution data (in the case of bank, credit or debit cards), etc. The card 40 may have any or all of the above data in machine-readable form such as bar code symbols in either one- or two-dimensional format.

The card 40 may have an integrated chip embedded therein as in the case of "smart" cards, or may even have the resonant elements discussed above in connection with RF readers supported by the cards. In each case, the card has a longitudinal edge 44 extending in a longitudinal direction generally parallel to the longitudinal direction along which the stripe 36 extends. This edge 44 serves as a guide and insures that the stripe 36 is correctly positioned relative to the sensor 32 as the card is slid past the sensor as is common with magnetic stripe technology.

The sensor 32 detects the data encoded in the stripe and generates an electrical data signal which is then processed and digitized to obtain a digital signal which is conducted to the CPU 24 for processing in accordance with a stored algorithm. The output signal from the CPU is fed to the output interface 28.

As described so far, the RF reader circuit 12 and the magnetic stripe reader circuit 30 share the common CPU 24 and, in some cases, can share some of the signal processing and digitizer components in the signal processors 22 and 34. As shown in FIG. 2, reference numeral 50 generally identifies a common support such as the aforementioned SE 1200 laser scan engine module on which the RF reader and magnetic stripe reader circuits 12, 30 are supported. The support 50 includes a generally planar base 52 and a printed circuit board 54 mounted in a plane generally parallel to and elevated relative to the base 52. The support 50 also includes a standard laser scan engine circuit 64 depicted in FIG. 1, and including a laser diode 66 for emitting a laser beam, lenses 68 for focusing

the laser beam, a scan mirror 70 for reflecting the beam outwardly of the module, a drive 72 for moving the scan mirror and sweeping the beam across a bar code symbol 80 for reflection therefrom, a photodiode 74 for detecting the reflected light, and a collection mirror 76 and collection optics 78 for collecting the reflected light and directing it to the photodiode, as well as signal processor and digitizer circuitry 82 for processing and digitizing a detected signal generated by the photodiode.

The symbol 80 is machine-readable and is one-or two-dimensional. The symbol 80 is associated with a target or object 84 and identifies the object.

FIG. 3 depicts an opposite side view of the support of FIG. 2, in which the magnetic stripe sensor 32 is depicted. The sensor 32 is recessed into the support so that the maximum form factor dimensions of the SE 1200 will not be exceeded. The RF reader circuit 12 is mounted on the printed circuit board 54, or may be mounted on another printed circuit board mounted on the module.

FIG. 4 depicts a hand-held data collection terminal 60 in which the module of FIGS. 2 and 3 is mounted during swiping of the card 40 past the sensor 32. A card reading slot 62 is formed in the terminal.

It will be understood that each of the elements described above, or two or more together, also may find a useful application in other types of constructions differing from the types described above.

While the invention has been illustrated and described as embodied in a combined magnetic stripe reader and radio frequency tag reader in a data collection module, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can, by applying current knowledge, readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended claims.

I CLAIM:

1. A data collection module, comprising:

a) a support having a predetermined form factor;

b) a radio frequency (RF) reader supported by the support, and operative for interrogating an RF element associated with a target, and for reading RF data relating to the target from the interrogated element; and

c) a magnetic stripe reader supported by the support, and operative for sensing magnetically encoded data in a stripe on a card, and for reading the encoded data.

2. The data collection module of claim 1, wherein the form factor occupies a space for an SE 1200 scan engine.

3. The data collection module of claim 1, wherein the support includes a printed circuit board on which electrical circuit components for the RF and stripe readers are mounted.

4. The data collection module of claim 1, wherein the RF reader includes a transmitting antenna, a receiving antenna, and a wireless data transceiver for interrogating the RF element via the transmitting antenna, and for reading the RF data via the receiving antenna.

5. The data collection module of claim 1, wherein the magnetic stripe reader includes a sensor.

6. The data collection module of claim 1, wherein the RF reader and the magnetic stripe reader are supported within the predetermined form factor.

7. The data collection module of claim 1, wherein the RF reader and the magnetic stripe reader generate digital signals corresponding to the RF data and the magnetically encoded data respectively, and wherein the readers share a central processing unit for receiving and processing the digital signals, and for outputting the processed signals through a common interface.

8. A data collection terminal, comprising:

a) a hand-held housing;

b) a support supported by the housing and having a predetermined form factor;

c) a radio frequency (RF) reader supported by the support, and operative for interrogating an RF element associated with a target, and for reading RF data relating to the target from the interrogated element; and

d) a magnetic stripe reader supported by the support, and operative for sensing magnetically encoded data in a stripe on a card, and for reading the encoded data.

9. The data collection terminal of claim 8, wherein the form factor occupies a space for an SE 1200 scan engine.

10. The data collection terminal of claim 8, wherein the support includes a printed circuit board on which electrical circuit components for the RF and stripe readers are mounted.

11. The data collection terminal of claim 8, wherein the RF reader includes a transmitting antenna, a receiving antenna, and a wireless data transceiver for interrogating the RF element via the transmitting antenna, and for reading the RF data via the receiving antenna.

12. The data collection terminal of claim 8, wherein the magnetic stripe reader includes a sensor.

13. The data collection terminal of claim 8, wherein the RF reader and the magnetic stripe reader are supported within the predetermined form factor.

14. The data collection terminal of claim 8, wherein the RF reader and the magnetic stripe reader generate digital signals corresponding to the RF data and the magnetically encoded data respectively, and wherein the readers share a central processing unit for receiving and processing the digital signals, and for outputting the processed signals through a common interface.

15. A data collection method, comprising the steps of:

a) supporting a radio frequency (RF) reader on a support having a predetermined form factor;

b) interrogating an RF element associated with a target, and reading RF data relating to the target from the interrogated element; and

c) supporting a magnetic stripe reader supported on the support; and

d) sensing magnetically encoded data in a stripe on a card, and reading the encoded data.

16. The data collection method of claim 15, wherein the form factor occupies a space for an SE 1200 scan engine.

17. The data collection method of claim 15; and further comprising the step of mounting electrical circuit components for the RF and stripe readers on a printed circuit board.

18. The data collection method of claim 15, wherein the supporting steps are performed by positioning the RF reader and the magnetic stripe reader within the predetermined form factor.

19. The data collection method of claim 15; and further comprising the step of generating digital signals corresponding to the RF data and the magnetically encoded data, sharing a central processing unit for receiving and processing the digital signals, and outputting the processed signals through a common interface.

ABSTRACT OF THE DISCLOSURE

A magnetic stripe reader and a radio frequency tag reader are supported on a common support having a predetermined form factor, especially a scan engine module utilized in hand-held bar code symbol scanners.

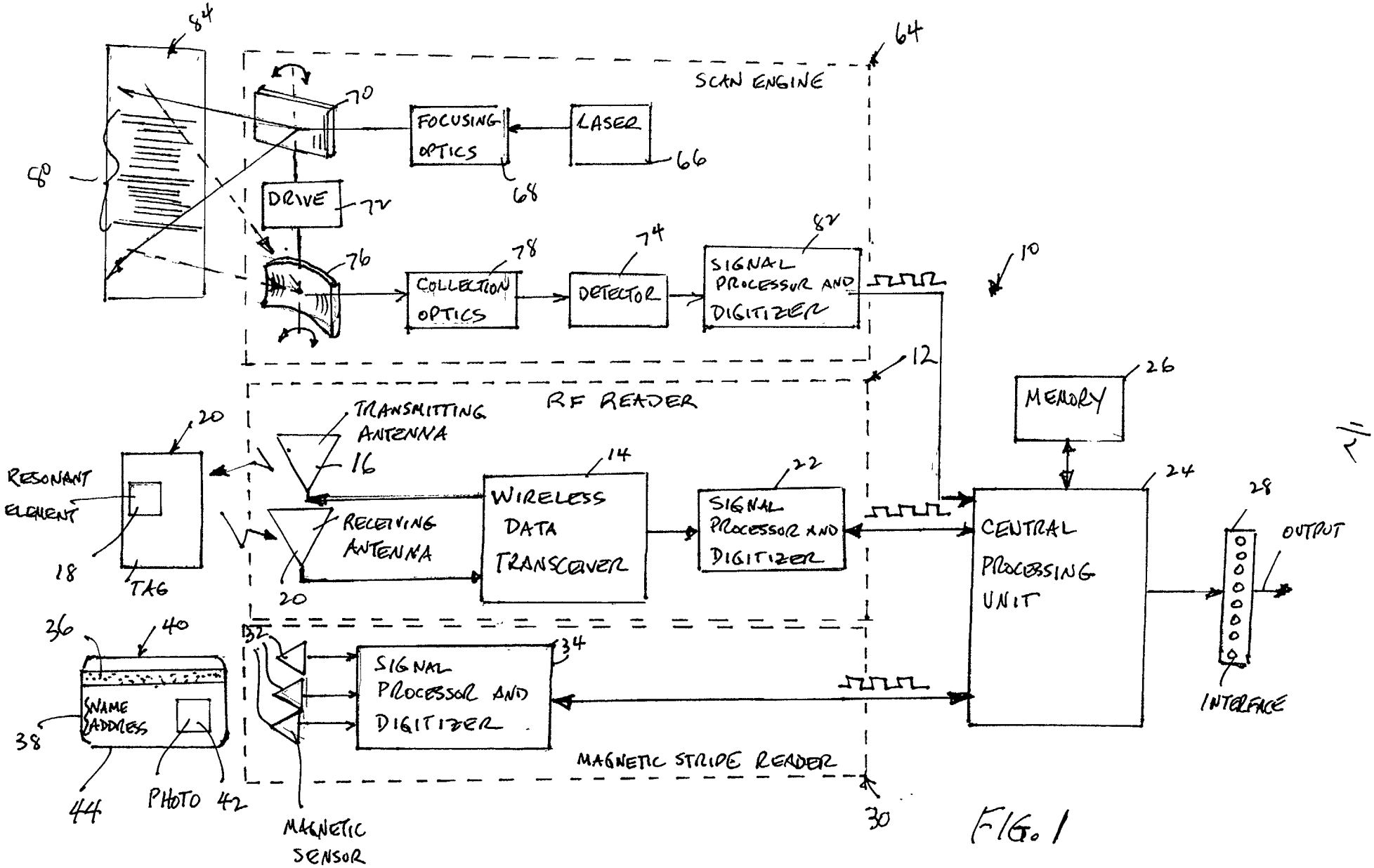
84
64
SCAN ENGINE
70
FOCUSING OPTICS
LASER
66
68
50
DRIVE
72
76
78
74
82
COLLECTION OPTICS
DETECTOR
SIGNAL PROCESSOR AND DIGITIZER
10
12
RF READER
MEMORY
26
TRANSMITTING ANTENNA
16
20
RESONANT ELEMENT
18
TAG
RECEIVING ANTENNA
20
14
WIRELESS DATA TRANSCEIVER
22
SIGNAL PROCESSOR AND DIGITIZER
24
CENTRAL PROCESSING UNIT
28
OUTPUT
INTERFACE
36
40
NAME ADDRESS
38
44
PHOTO
42
32
34
SIGNAL PROCESSOR AND DIGITIZER
MAGNETIC SENSOR
MAGNETIC STRIPE READER
30

FIG. 1

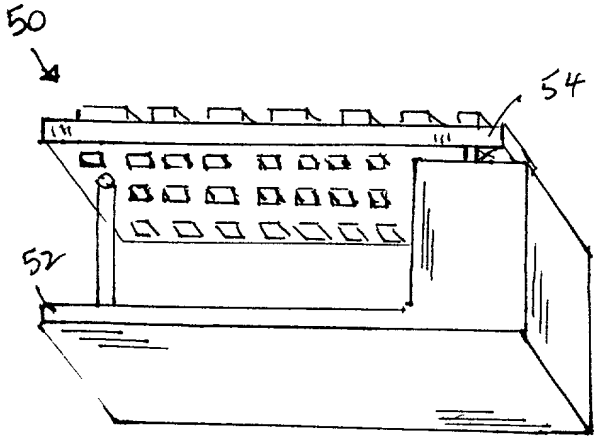

FIG. 2

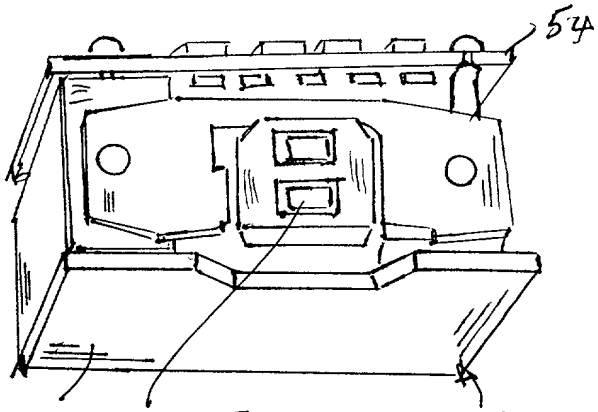

FIG. 3

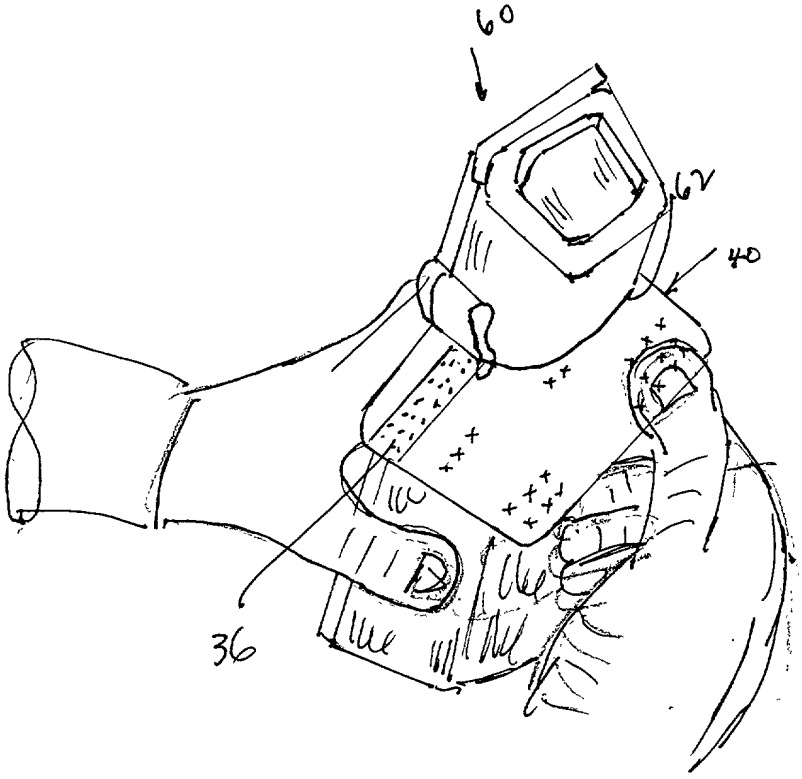

FIG. 4